भारतीय मानक

संवातन और वर्षा जल-संग्रहण के तंत्र सहित भवनों के अन्दर व बाहर की मिट्टी तथा अपशिष्ट निरावेशन तंत्र के लिए अनम्यकृत पोलीविनाइल क्लोराइड (पीवीसी-यु) पाइपें — विशिष्टि

(पहला पुनरीक्षण)

Indian Standard

UNPLASTICIZED POLYVINYL CHLORIDE (PVC-U) PIPES FOR SOIL AND WASTE DISCHARGE SYSTEM FOR INSIDE AND OUTSIDE BUILDINGS INCLUDING VENTILATION AND RAIN WATER SYSTEM — SPECIFICATION

(First Revision)

ICS 91.140.80; 23.040.20

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

May 2013 **Price Group 6**

Plastic Piping Systems Sectional Committee, CED 50

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Plastic Piping Systems Sectional Committee had been approved by the Civil Engineering Division Council.

This standard was first published in 1992. In the revision of this standard considerable assistance has been derived from ISO 3633 : 2002 ‘Plastics piping systems for soil and waste discharge (low and high temperature) inside buildings — Unplasticized polyvinyl chloride (PVC-U)’ Scope of the standard however has been retained for inside and outside buildings and types and dimensions have been kept as per manufacturing practices prevailing in India. Tests such as ‘Airtightness’ and ‘Elevated-temperature cycling’ have not been included due to non-availability of testing facilities in India. ‘Effect on sunlight’, ‘Stress relief’, ‘Resistance to sulphuric acid’, ‘Axial shrinkage’ and ‘Tensile’ tests have been retained keeping in view the outside use and Indian conditions. In this revision following major modifications have been made:

a) Pipes of nominal outside diameters up to 315 mm have been included,
b) Method for ‘Effect on sunlight’ test has been modified,
c) ‘Resistance to external blows at 0°C’ and ‘Tensile’ tests are not alternate to each other, and
d) ‘Resistance to dicholoromethane at specified temperature’ test has been included.

The composition of the Committee responsible for the formulation of this standard is given in Annex D.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 ‘Rules for rounding off numerical values (*revised*)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

UNPLASTICIZED POLYVINYL CHLORIDE (PVC-U) PIPES FOR SOIL AND WASTE DISCHARGE SYSTEM FOR INSIDE AND OUTSIDE BUILDINGS INCLUDING VENTILATION AND RAIN WATER SYSTEM — SPECIFICATION

(First Revision)

1 SCOPE

This standard covers requirements for plain and socket end unplasticized polyvinyl chloride (PVC-U) pipes with nominal outside diameters 40 mm to 315 mm for use for soil and waste discharge system inside and outside buildings including ventilation, rain water and rain water harvesting applications.

2 REFERENCES

The following Indian Standards contain provisions, which through reference in this text constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreement based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below.

IS No.	*Title*
4669 : 1968	Methods of test for polyvinyl chloride resins
4905 : 1968	Methods for random sampling
4985 : 2000	Unplasticized PVC pipes for potable water supplies — Specification
12235	Thermoplastics pipes and fittings — Methods of test:
(Part 1) : 2004	Measurement of dimensions
(Part 2) : 2004	Determination of vicat softening temperature
(Part 5) : 2004	Longitudinal reversion
(Part 6) : 2004	Stress relief test
(Part 7) : 2004	Resistance to sulphuric acid
(Part 8) : 2004	Resistance to internal hydrostatic pressure
(Part 9) : 2004	Resistance to external blows (impact resistance) at 0°C (round-the-clock method)
(Part 11) : 2004	Resistance to dichloromethane at specified temperature
(Part 13) : 2004	Determination of tensile strength and elongation
14182 : 2004	Solvent cement for use with polyvinyl chloride pipes and fittings

3 TYPES OF PIPES

Type A — for use in ventilation pipe work and rain water and rain water harvesting applications.

Type B — for use in soil and waste discharge systems.

4 SIZE DESIGNATION

4.1 Pipes shall be designated by the nominal outside diameter DN, in mm.

4.2 Nominal outside diameter DN of pipes as covered in the standard are 40, 50, 63, 75, 90, 110, 125, 140, 160, 180, 200, 250 and 315 mm.

5 COLOUR OF PIPE

Surface colour of the pipes shall be dark shade of grey.

6 MATERIALS

6.1 The material from which the pipes are produced shall consist essentially of polyvinyl chloride to which may be added only those additives that are needed to facilitate the manufacture of sound and durable pipes of good surface finish, mechanical strength, and opacity under condition of use. None of these additives shall be used separately or together in quantities sufficient to constitute a toxic hazard, impair the fabrication, welding, chemical and physical properties of the pipes. The material should also consist of sufficient quantity of stabilizer to help the pipe withstand thermal ageing and exposure to ultra-violet light.

6.2 The addition of the manufacturer's own rework material is permissible. The quantity of the rework material used is to be declared by the manufacturer. No other rework material shall be used.

6.3 The composition shall be based on PVC resin having a *K*-value of 64 or greater when tested in accordance with IS 4669.

7 DIMENSIONS

7.1 Diameter and Wall Thickness

Mean outside diameter, outside diameter at any point and wall thickness for Type A and Type B pipes manufactured plain or with socket shall be as given in Table 1. Dimensions shall be measured according to the method given in IS 12235 (Part 1).

7.2 Length of Pipe

Pipes shall be supplied in nominal lengths of 2, 3, 4 or 6 metres either plain or with socket for solvent cementing/grooved socket. Tolerances on specified length shall be + 10 mm and – 0 mm.

NOTE — The pipes may be supplied in other lengths where so agreed to between the manufacturer and the purchaser

7.2.1 The nominal length of the pipe with socket for solvent cementing/grooved socket shall be as given in Fig. 1.

7.3 Socket of Pipe

7.3.1 Minimum wall thickness of socket on pipes shall be as given in Table 2 read with Fig. 2 and Fig. 3.

7.3.2 Dimensions of sockets for solvent cementing and grooved sockets of pipes shall be as given in Tables 3 and 4 respectively, read with Fig. 2 and 3.

Table 1 Dimension of Pipes

(*Clause* 7.1)

All dimensions in millimetres.

Sl No.	Nominal Outside Diameter	Mean Outside Diameter		Outside Diameter at Any Point		Wall Thickness, *S* Type A		Wall Thickness, *S* Type B	
	DN	*Min*	*Max*	*Min*	*Max*	*Min*	*Max*	*Min*	*Max*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
i)	40	40.0	40.3	39.5	40.5	1.8	2.2	3.2	3.8
ii)	50	50.0	50.3	49.4	50.6	1.8	2.2	3.2	3.8
iii)	63	63.0	63.3	62.2	63.8	1.8	2.2	3.2	3.8
iv)	75	75.0	75.3	74.1	75.9	1.8	2.2	3.2	3.8
v)	90	90.0	90.3	88.9	91.2	1.9	2.3	3.2	3.8
vi)	110	110.0	110.4	108.6	111.4	2.2	2.7	3.2	3.8
vii)	125	125.0	125.4	123.5	126.5	2.5	3.0	3.2	3.8
viii)	140	140.0	140.5	138.3	141.7	2.9	3.4	3.6	4.2
ix)	160	160.0	160.5	158.0	162.0	3.2	3.8	4.0	4.6
x)	180	180.0	180.6	177.8	182.2	—	—	4.6	5.5
xi)	200	200.0	200.6	197.6	202.4	—	—	4.9	5.6
xii)	250	250.0	250.8	247.0	253.0	—	—	6.2	7.1
xiii)	315	315.0	316.0	311.2	318.8	—	—	7.7	8.7

Table 2 Minimum Wall Thickness of Sockets on Pipes

(*Clause* 7.3.1)

All dimensions in millimetres.

Sl No.	Nominal Outside Diameter	S_2 *Min*		S_3 *Min*	
	DN	Type A	Type B	Type A	Type B
(1)	(2)	(3)	(4)	(5)	(6)
i)	40	1.6	2.9	1.0	2.4
ii)	50	1.6	2.9	1.0	2.4
iii)	63	1.6	2.9	1.0	2.4
iv)	75	1.6	2.9	1.0	2.4
v)	90	1.7	2.9	1.1	2.4
vi)	110	2.0	2.9	1.2	2.4
vii)	125	2.3	2.9	1.4	2.4
viii)	140	2.6	3.2	1.6	2.7
ix)	160	2.9	3.6	1.8	3.0
x)	180	—	4.1	—	3.4
xi)	200	—	4.4	—	3.7
xii)	250	—	5.5	—	4.7
xiii)	315	—	6.9	—	5.8

Table 3 Dimensions for Sockets for Solvent Cementing

(*Clause* 7.3.2)

All dimensions in millimetres.

Sl No.	Nominal Outside Diameter	Socket Depth *C*	Mean Inside Diameter of Socket at Midpoint, D_1	
	DN	*Min*	*Min*	*Max*
(1)	(2)	(3)	(4)	(5)
i)	40	26.0	40.1	40.3
ii)	50	30.0	50.1	50.3
iii)	63	36.0	63.1	63.3
iv)	75	40.0	75.1	75.3
v)	90	46.0	90.1	90.3
vi)	110	48.0	110.1	110.4
vii)	125	51.0	125.1	125.4
viii)	140	54.0	140.2	140.5
ix)	160	58.0	160.2	160.5
x)	180	60.0	180.2	180.5
xi)	200	60.0	200.3	200.6
xii)	250	60.0	250.4	250.8
xiii)	315	60.0	315.4	316.0

8 PHYSICAL TEST REQUIREMENTS

8.1 Visual Appearance

The internal and external surface of the pipes shall be smooth and clean, and free from grooving and other defects. The end shall be clearly cut and shall be square with the axis of the pipe. The end may be chamfered on the plain side. Slight shallow longitudinal grooves or irregularities in the wall thickness shall be permissible provided the wall thickness remains within the permissible limits.

8.2 Reversion Test

When tested by the method described in IS 12235 (Part 5), a length of pipe sample of 200 ± 20 mm shall not alter in length by more than 5 percent. In the case of socket ended pipes, this test shall be carried out on the plain portion of pipe taken at least 100 mm away from the root of the socket.

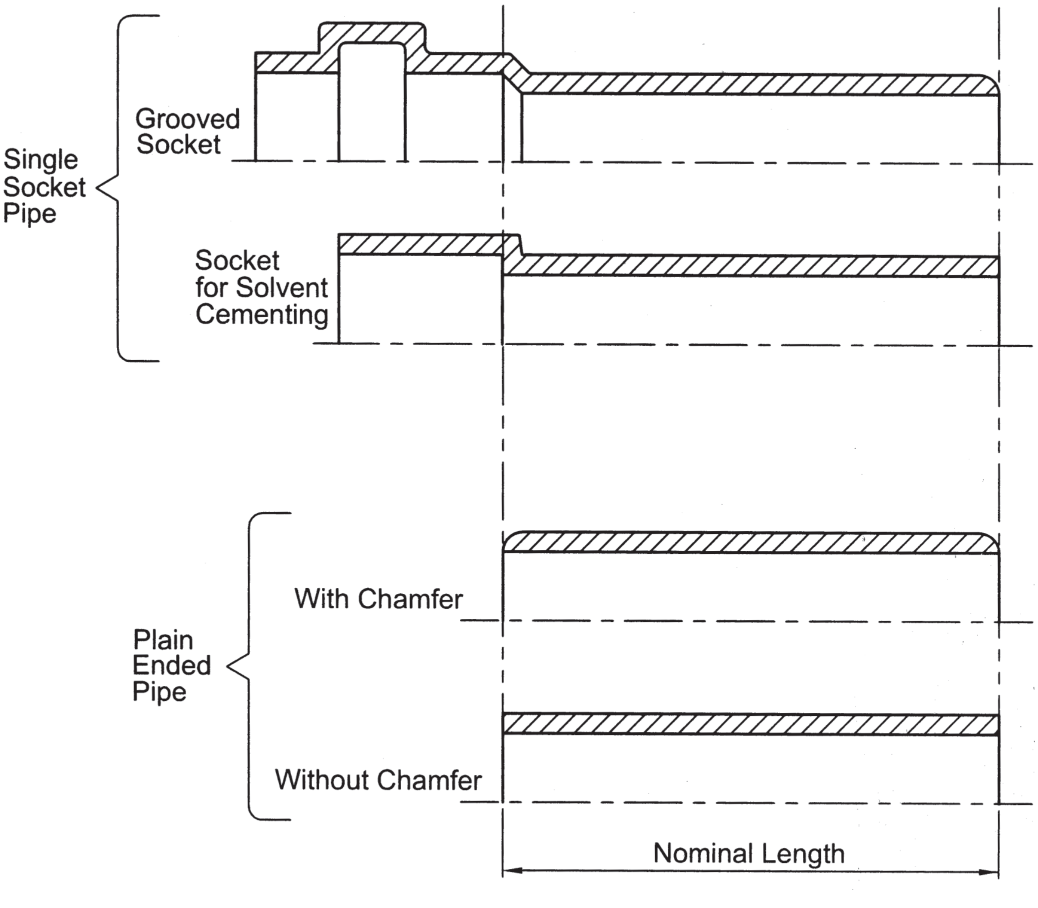

FIG. 1 NOMINAL PIPE LENGTH AND DIMENSIONS

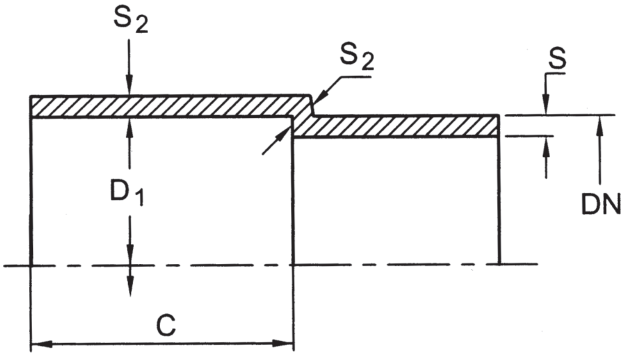

FIG. 2 SOLVENT CEMENTING SOCKET DETAIL

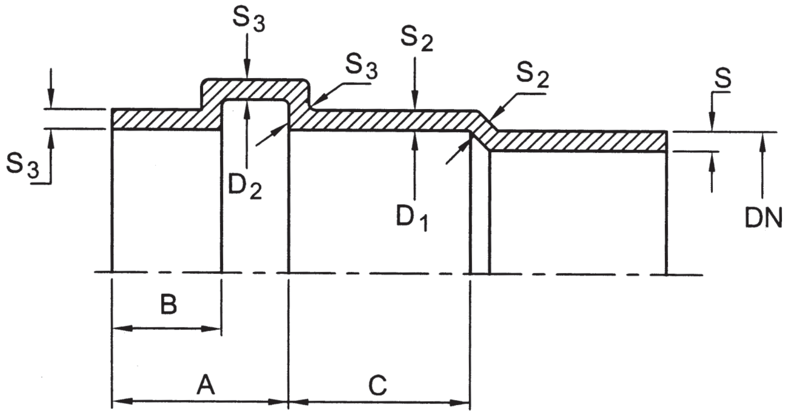

FIG. 3 GROOVED SOCKET DETAIL

Table 4 Dimensions of Grooved Socket

(*Clause* 7.3.2)

All dimensions in millimetres

Sl No.	Nominal Outside Diameter *DN*	Inside Diameter of Socket, D_1		Inside Diameter of Beading, D_2		Length of Beading and Neck *A*	Neck of Socket *B*	Length Beyond Beading *C*
		Min	*Max*	*Min*	*Max*	*Max*	*Min*	*Min*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
i)	40	40.3	41.1	49.6	50.6	18	5	18
ii)	50	50.3	51.1	59.6	60.6	18	5	20
iii)	63	63.3	64.1	72.9	73.9	18	5	23
iv)	75	75.3	76.4	84.5	85.5	20	5	25
v)	90	90.3	91.4	99.5	100.5	23	5	28
vi)	110	110.4	111.6	120.3	121.3	26	6	32
vii)	125	125.4	126.4	137.1	138.2	28	7	35
viii)	140	140.5	141.4	152.1	153.2	30	8	38
ix)	160	160.5	161.5	173.8	175.0	32	9	42
x)	180	180.6	181.5	193.8	195.0	36	10	46
xi)	200	200.6	201.8	214.0	215.4	40	15	50
xii)	250	250.8	252.0	264.0	265.4	70	15	55
xiii)	315	316.0	317.2	329.0	330.4	70	15	62

8.3 Stress Relief Test

This test shall be carried out for socket end pipes only. When tested by the method described in IS 12235 (Part 6), the test specimens shall not show blisters, excessive delamination or cracking or signs of weld line splitting. The weld line or lines may become pronounced during the test, but this shall not be deemed to constitute failure.

8.4 Vicat Softening Temperature

When determined in accordance with IS 12235 (Part 2), the vicat softening temperature of the specimen shall not be less than 79°C.

8.5 Effect of Sunlight

Two samples each 300 mm long from different length of pipes shall be prepared. One sample shall be kept covered in thick paper and kept in shade as control sample and the other exposed to sun for not less than 1 600 h at ambient temperature. After the required period of exposure, the tensile strengths of two samples when tested as per IS 12235 (Part 13) shall not show difference of more than 20 percent of their initial tensile strengths.

NOTE — Alternatively, effect of sunlight on the pipe may tested using weatherometer for an equivalent exposure time. Relationship, however, shall be established to the satisfaction of purchaser/inspection agency that duration of the exposure required using weatherometer is comparable with stipulated exposure to the sun for 1 600 h.

9 RESISTANCE TO SULPHURIC ACID

When tested by the method described in IS 12235 (Part 7), the mass of specimen shall neither increase by more than 0.32 g nor decrease by more than 0.13 g. The effect of the acid on the surface appearance of the specimen (roughening, bleaching, or blacking) shall be ignored.

10 MECHANICAL PROPERTIES

10.1 Resistance to External Blows at 0°C (Impact Test)

When tested by method prescribed in IS 12235 (Part 9), the pipe shall have a true impact rate of not more than 10 percent. Mass of striker and height of fall shall be as per Annex A.

In case of socket end pipes, this test shall be carried out on the plain portion of the pipes taken at least 100 mm away from the root of the socket.

10.2 Tensile Strength

When determined in accordance with the method described in IS 12235 (Part 13), the tensile strength at break shall not be less than 45 MPa.

10.3 Axial Shrinkage (for Type B Pipes Only)

The axial shrinkage shall not exceed 2 percent when determined in accordance with Annex B.

11 WATER TIGHTNESS OF JOINT

The assembly of pipe and fitting shall be tested for water tightness in apparatus, which consist of two end sealing devices for the open ends of the fittings, one end connected to a hydraulic pressure source shall be capable of allowing the system to bled and the other end blanked.

Assemble the systems with the sealing devices [(a) in the case of socket for solvent cementing, the joint has to be achieved by using solvent cement, and (b) in the case of grooved socket, the joint has to be achieved by fitting the rubber sealing ring in the groove], fill with water ensuring all air is removed. Jointing of solvent cementing joints is to be carried out using solvent conforming to IS 14182.

Apply a pressure of 0.05 MPa for a period of 15 min and there should be no leakage at any joint.

12 RESISTANCE TO DICHLOROMETHANE AT SPECIFIED TEMPERATURE

When tested in accordance with the method described in IS 12235 (Part 11), there shall be no attack observed on any part of the surface of the test piece.

13 SAMPLING AND CRITERIA FOR CONFORMITY

13.1 Acceptance Test

The scale of sampling and criteria for conformity as a lot for acceptance tests specified in Table 5 shall be as given in Annex C.

13.2 Type Tests

Type test given in Table 5 shall be conducted whenever a change is made in the material composition; method of manufacture or a new size of pipe is to be introduced. However, if no change is envisaged, at least one sample from each size and type produces during the period shall be subjected to type tests once in six months.

14 MARKING

14.1 Each pipe shall be clearly and indelibly marked with the following information at intervals not more than 3 m.

a) Manufacturer's name or trade-mark;
b) Nominal outside diameter of pipe;
c) Type A or Type B, as appropriate; and
d) Batch No.

14.1.1 *Class of Pipe* — *Colour*

Class of Pipe	*Colour*
Type A	Blue
Type B	White

14.2 BIS Certification Marking

14.2.1 Each pipe may also be marked with the Standard Mark.

14.2.2 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act*, 1986 and the Rules and Regulations made thereunder. Details of conditions under which a licence for the use of the Standard Mark may be granted to the manufacturer or producer may be obtained from the Bureau of Indian Standards.

Table 5 Acceptance and Type Tests
(*Clauses* 13.1 *and* 13.2)

Sl No.	Test	Clause	Acceptance Test	Type Test
(1)	(2)	(3)	(4)	(5)
i)	Colour	5	√	
ii)	Dimensional	7.1 7.2 7.3	√	
iii)	Visual	8.1	√	
iv)	Reversion	8.2	√	
v)	Stress relief test	8.3	√	
vi)	Impact strength	10.1	√	
vii)	Tensile strength	10.2	√	
viii)	Axial shrinkage	10.3	√	
ix)	Water tightness of joint	11	√	
x)	Vicat softening temperature	8.4		√
xi)	Effect of sunlight	8.5		√
xii)	Resistance to H_2SO_4	9		√
xiii)	Resistance to dichloromethane at specified temperature	12	√	

ANNEX A

(*Clause* 10.1)

MASS OF STRIKER AND HEIGHT OF FALL FOR IMPACT TEST

A-1 The mass of striker and height of fall for impact test shall be in accordance with Table 6.

Table 6 Classified Striker Mass and Drop Height Conditions for the Falling Weight Impact Test

Sl No.	Nominal Outside Diameter of Pipes, d_n mm	Mass of Falling Weight kg	Fall Height mm
(1)	(2)	(3)	(4)
i)	40 to 50	0.25 ± 0.5%	1 000 ± 10
ii)	63 to 75	0.25 ± 0.5%	2 000 ± 10
iii)	90 to 110	0.50 ± 0.5%	2 000 ± 10
iv)	125 and above	1.00 ± 0.5%	2 000 ± 10

ANNEX B

(*Clause* 10.3)

DETERMINATION OF AXIAL SHRINKAGE OF PIPES

B-1 GENERAL

This Annex prescribes test method for determining permanent axial shrinkage at 90 °C.

B-2 APPARATUS

B-2.1 Thermostatically Controlled Water Bath

Capable of being maintained at 90°C ± 2°C.

The volume and performance of the bath shall be such that there is virtually no variation in temperature when the test pieces are immersed. The water in the bath shall not contain substances, which can alter the product investigated.

Adequate stirring shall be provided so that the temperature limits are complied with at all points in the bath.

B-2.2 Mounting Device for the Test Pieces

B-2.3 Thermometer graduated in divisions of 0.5°C.

B-3 TEST PIECES

Select three pipe samples of 300 mm ± 20 mm in length. Mark each pipe sample for example by means of a scriber around the circumference with two circular marks. 200 mm a part, such that one of them is approximately 10 mm from corresponding end.

B-4 CONDITIONING

Condition the test pieces for at least 2 h at 27°C ± 2°C.

B-5 PROCEDURE

With the test piece at the temperature of 27°C ± 2°C measure the distance between marks to the nearest 0.25 mm. Regulate the temperature of the water in the bath to 90°C ± 2°C. Suspend the test pieces vertically in the water bath by the ends furthest from the marks, Such that the whole test piece is immersed in the water and the upper end is at least 50 mm below the surface of the water.

The test pieces shall be placed in such a position that they touch neither the walls nor the bottom of the bath.

Leave the test pieces immersed for 1 h.

Remove the test pieces from the bath and after complete cooling to 27°C ± 2°C, measure under the same condition as above, the distance between the marks along two lines running parallel to the longitudinal axis of the pipe sample and diametrically opposite to each other on the pipe sample.

B-6 EXPRESSION OF RESULTS

Calculate the percentage change in distance between the marks on the piece using the equation:

$$T = \frac{\Delta L}{L} \times 100$$

where

T = percentage change in length or shrinkage.

$\Delta L = L_0 - L.$

L_0 = distance in millimetre between the marks before the test.

L = distance in millimetre between the marks after the test.

Select the value of L, which gives the greatest value of ΔL.

For the value of axial shrinkage of the pipe, take the arithmetic mean of the value obtained for each of three test pieces.

ANNEX C

(*Clause* 13.1)

SCALE OF SAMPLING AND CRITERIA FOR CONFORMITY FOR ACCEPTANCE TEST

C-1 LOT

C-1.1 All pipes, in a single consignment, of the same size and manufactured under essentially similar condition shall constitute a lot.

C-1.2 For ascertaining conformity of the lot to the requirements of the standard, samples shall be tested from each lot separately.

C-2 COLOUR, VISUAL APPEARANCE AND DIMENSIONAL REQUIREMENTS

C-2.1 The number of test samples taken from a lot shall depend on the size of the lot and size of pipes. This shall be in accordance with Table 7 or 8, as appropriate.

C-2.2 The pipes shall be selected at random from the lot and in order to ensure the randomness of selection, a random number table shall be used. For guidance and use of random number tables, IS 4905 may be referred to. In the absence of random number table, the following procedure may be adopted.

Starting from any pipe, in the lot, count them as 1, 2, 3, etc, up to *r* and so on, where *r* is integral part of *N/n*, *N* being the number of pipes in the lot and *n*, the number of pipes in the sample. Every r^{th} pipe so counted shall be withdrawn so as to constitute the required sample size.

C-2.3 The number of pipes given for the first sample in col 4 of Table 7 or 8 shall be taken from the lot and examined for colour, visual appearance and for dimensional requirement. A pipe failing to satisfy any of the requirements shall be considered as defective. The lot shall be deemed to have satisfied these requirements if the number of defective found in the first sample is less than or the corresponding acceptance number given in col 6 of Table 7 or 8. The lot shall be deemed not to have met these requirements if the numbers of defectives found in the first sample is greater than or equal to the corresponding rejection number given in col 7 of Tables 7 or 8. If however, the numbers of defectives found in the first sample lies between the corresponding acceptance and rejection number given col 6 and 7 a second sample of the size given in col 4 shall be taken and examined for these requirements. The lot shall be considered to have satisfied these requirements if the number of defectives found in the cumulative sample is less than or equal to the corresponding acceptance number given in col 6 otherwise not.

Table 7 Scale of Sampling for Colour, Visual Appearance and Dimensional Requirements (for DN Up to and Including 110 mm)

(*Clauses* C-2.1 *and* C-2.3)

Sl No. (1)	Number of Pipes in the Lot (2)	Sample Number (3)	Sample Size (4)	Cumulative Sample Size (5)	Acceptance Number (6)	Rejection Number (7)
i)	Up to 1 000	First	13	13	0	2
		Second	13	26	1	2
ii)	1 001 to 3 000	First	20	20	0	3
		Second	20	40	3	4
iii)	3 001 to 10 000	First	32	32	1	4
		Second	32	64	4	5
iv)	10 001 and above	First	50	50	2	5
		Second	50	100	6	7

Table 8 Scale of Sampling for Colour, Visual Appearance and Dimensional Requirements (for *DN* Above 110 mm)

(*Clauses* C-2.1 *and* C-2.3)

Sl No. (1)	Number of Pipes in the Lot (2)	Sample Number (3)	Sample Size (4)	Cumulative Sample Size (5)	Acceptance Number (6)	Rejection Number (7)
i)	Up to 3 000	First	8	8	0	2
		Second	8	16	1	2
ii)	3 001 to 10 000	First	13	13	0	2
		Second	13	26	1	2
iii)	10 001 and above	First	20	20	0	3
		Second	20	40	3	4

C-3 OTHER ACCEPTANCE TESTS

The lot having satisfied the colour, visual and dimensional requirements shall be tested for reversion, stress relief, resistance to dichloromethane and axial shrinkage tests. For this purpose a sub sample from those under **C-2.3** shall be drawn as given in col 4 of Table 9 or 10, as appropriate for the first/second sample size. The lot shall be deemed to have met the requirements given in the corresponding acceptance number given in col 6 of Table 9 or 10, as relevant. The lot shall be deemed not to have met these requirements, if the number of defectives found in the first sample is greater than or equal to the corresponding rejection number given in col 7 of Tables 9 or 10. If however the number of defectives found in the first samples lies between corresponding acceptance and rejection number given in col 6 and 7 of Table 9 or 10, a second sample size given in col 4 shall be taken and examined for requirements. The lot shall be considered to have satisfied the requirements, if number of defective found in the cumulative sample is less than or equal to the corresponding acceptance number given in col 5, otherwise not.

C-4 IMPACT STRENGTH

C-4.1 Number of Test Specimens

For this purpose, the procedure adopted for sampling as per Table 11.

Table 9 Scale of Sampling for Reversion, Stress Relief, Resistance to Dichloromethane and Axial Shrinkage Tests (for *DN* Up to and Including 110 mm)

(*Clause* C-3)

Sl No. (1)	Number of Pipes in the Lot (2)	Sample Number (3)	Sample Size (4)	Cumulative Sample Size (5)	Acceptance Number (6)	Rejection Number (7)
i)	Up to 1 000	First	5	5	0	2
		Second	5	10	1	2
ii)	1 00 1 to 3 000	First	8	8	0	2
		Second	8	16	1	2
iii)	3 001 to 10 000	First	13	13	0	2
		Second	13	26	1	2
iv)	10 001 and above	First	20	20	0	3
		Second	20	40	3	4

Table 10 Scale of Sampling for Reversion, Stress Relief, Resistance to Dichloromethane and Axial Shrinkage Tests (for *DN* Above 110 mm)

(*Clause* C-3)

Sl No. (1)	Number of Pipes in the Lot (2)	Sample Number (3)	Sample Size (4)	Cumulative Sample Size (5)	Acceptance Number (6)	Rejection Number (7)
i)	Up to 3 000	First	3	3	0	2
		Second	3	6	1	2
ii)	3 001 to 10 000	First	5	5	0	2
		Second	5	10	1	2
iii)	10 001 and above	First	8	8	0	2
		Second	8	16	1	2

C-5 TENSILE STRENGTH

C-5.1 Number of Test Specimens

For this purpose, the procedure adopted for sampling as per Table 11.

C-6 WATER TIGHTNESS TEST

C-6.1 The lot having been found satisfactory according to **C-2** to **C-4** shall be subjected to the test.

C-6.2 For determining the conformity of pipes in the lot to the requirements for water tightness, the number of pipes to be taken from the lot shall be in accordance to Table 12.

C-6.3 The pipes shall be taken at random from the lot in accordance with the procedure given in **C-2.2**.

C-6.4 The lot shall be considered to have met the requirement for this test; if the number of test samples failing in this requirement is equal to the corresponding acceptance number given to in col 4 of Table 12.

Table 11 Scale of Sampling for Resistance to External Blows at 0°C (Impact Test) and Tensile Test (for *DN* 40 to 315 mm)

(*Clauses* C-4.1 *and* C-5.1)

Sl No. (1)	Number of Pipes in the Lot (2)	Sample Number (3)	Sample Size (4)	Cumulative Sample Size (5)	Acceptance Number (6)	Rejection Number (7)
i)	Up to 3 000	First	3	3	0	2
		Second	3	6	1	2
ii)	3 001 to 10 000	First	5	5	0	2
		Second	5	10	1	2
iii)	10 001 and above	First	8	8	0	2
		Second	8	16	1	2

Table 12 Scale of Sampling for Water Tightness of Joints

(*Clauses* C-6.2 *and* C-6.4)

Sl No. (1)	Number of Pipes in the Lot (2)	Sample Size (3)	Acceptance Number (4)
i)	Up to 3 000	2	0
ii)	3 001 to 10 000	3	0
iii)	10 001 and above	5	0

ANNEX D

(*Foreword*)

COMMITTEE COMPOSITION

Plastic Piping System Sectional Committee, CED 50

Organization	*Representative(s)*
Central Institute of Plastic Engineering and Technology, Chennai	Dr S. K. Nayak (***Chairman***)
Bharat Sanchar Nigam Ltd, New Delhi	Chief Engineer (Civil) Shri A. K. Nagar (*Alternate*)
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Central Institute of Plastic Engineering and Technology, Chennai	Dr K. Palanivelu Shri R. K. Dwivedi (*Alternate*)
Central Public Health Environmental Engineering Organization, New Delhi	Adviser (PHE) Assistant Adviser (PHE) (*Alternate*)
Central Public Works Department, New Delhi	Chief Engineer (Design) Superintending Engineer (S&S) (*Alternate*)

Organization	*Representative(s)*
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Tamil Nadu Water Supply and Drainage Board, Chennai	Joint Chief Engineer (Contract) Engineering Director (*Alternate*)
In personal capacity (*Plot No. 1763, 6th Avenue, Anna Nagar West Chennai 600040*)	Shri G. K. Srinivasan
In personal capacity (*A-59, Sector 35, Noida 201301*)	Shri Kanwar A. Singh
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Scientist 'F' (CED), BIS

PVC and ABS Piping System Subcommittee, CED 50 : 2

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